5.16.21 SLUMP OF PORTLAND CEMENT CONCRETE (Kansas Test Method KT-21)

a. SCOPE

This method of test covers the procedure for determining the slump of freshly mixed concrete[a,b]. KT-21 reflects testing procedures found in AASHTO T 119.

NOTE a: This test method was originally developed to provide a technique to monitor the consistency of unhardened concrete. It is not applicable to nonplastic and noncohesive concrete, nor for concrete that contains 37.5 mm (1.5 in) or larger aggregate particles. Under laboratory conditions, with strict control of all concrete materials, the slump is generally found to increase proportionally with the water content of a given concrete mixture, and thus to be inversely related to concrete strength. Under field conditions, however, such a strength relationship is not clearly and consistently shown. Care should therefore be taken in relating slump results obtained under field conditions to strength.

NOTE b: Concretes having slumps less than 13 mm (0.5 in) may not be adequately plastic and concretes having slumps greater than about 230 mm (9 in) may not be adequately cohesive for this test to have significance. Caution should be exercised in interpreting such results.

b. REFERENCED DOCUMENTS

b.1. KT-17; Sampling Fresh Concrete

b.2. AASHTO T-119; Slump of Hydraulic Cement Concrete

c. APPARATUS

c.1. Mold or slump cone fabricated from metal not readily attacked by cement paste. The metal shall not be thinner than 1.5 mm (16 ga. BWG) or if formed by the spinning process, there shall be no point on the mold at which the thickness is less than 1.15 mm (0.045 in). The mold shall have the shape of a frustum of a right circular cone and be equipped with handles and foot plates. The dimensions shall be as follows:

c.1.a. Inside diameter at top.....…...102 ± 3.2 mm (4 ± 1/8 in)

c.1.b. Inside diameter at bottom.....205 ± 3.2 mm (8 ± 1/8 in)

c.1.c. Height.....…….....305 ± 3.2 mm (12 ± 1/8 in)

c.2. Molds other than metal are permitted provided they meet the dimensional requirements in **c.1.a., c.1.b., and c.1.c.**

c.2.a. The mold shall be sufficiently rigid to maintain the specified dimensions and tolerances during use, resistant to impact forces, and shall be nonabsorbent.

c.2.b. The mold shall be demonstrated to provide test results comparable to those obtained when using a metal mold.

c.2.b.1. Comparability shall be demonstrated on behalf of the manufacturer by an independent laboratory. Test for comparability shall consist of not less than 10 individual comparisons performed at each of 3 different slumps ranging from 50 mm (2 in) to 125 mm (5 in). No individual test results shall vary by more than 15 mm (.50 in) from that obtained using the metal mold. The average test results of each slump range shall not vary by more than 10 mm (0.30 in) from the average of test results obtained using the metal mold.

c.2.b.2. If any changes in material or method of manufacture are made, tests for comparability shall be repeated.

c.2.c. If the condition of any individual mold is suspected of being out of tolerance, a single comparative test shall be performed. If the test results differ by more than 15 mm (.50 in) from that obtained using a metal mold, the mold shall be removed from service.

c.3. Tamping rod shall be a straight steel rod 16 mm (5/8 in) in diameter, approximately 600 mm (24 in) in length and rounded to a hemispherical tip on the tamping end.

c.4. Hand Scoop.

d. TEST PROCEDURE

d.1. Obtain a sample of fresh concrete in accordance with KT-17.

d.2. Dampen the mold, place it on a flat, moist, nonabsorbent, rigid surface**.** It shall be held firmly in place during filling by the operator standing on the two foot pieces.

d.3. Fill the mold with concrete in three layers[c], each approximately one third the volume of the mold.

NOTE c: One third of the volume of the mold fills to a depth of 67 mm (2 5/8 in); two-thirds of the volume fills to a depth of 155 mm (6 1/8 in).

d.4. Rod each layer with 25 strokes of the tamping rod uniformly distributed over the cross-section of each layer. For the bottom layer, this will necessitate inclining the rod slightly and making approximately half of the strokes near the perimeter, and then progressing with vertical strokes spiraling toward the center. Rod the bottom layer throughout its depth. Rod the second layer and the top layer each throughout its depth, so that the strokes just penetrate into the underlying layer.

In filling and rodding the top layer, heap the concrete above the mold before rodding is started. If the rodding operation results in subsidence of the concrete below the top edge of the mold, add additional concrete to keep an excess of concrete above the top of the mold at all times. After the top layer has been rodded, strike off the surface of the concrete by means of a screeding and rolling motion of the tamping rod. Remove the mold immediately from the concrete by raising it carefully in a vertical direction[d].

NOTE d: The operation of raising the mold shall be performed in 5± 2 sec. by a steady upward lift with no lateral or torsional motion being imparted to the concrete. The entire operation from the start of the filling through removal of the mold shall be carried out without interruption and shall be completed within an elapsed time of 2 1/2 min.

d.5. Immediately measure the slump by determining the difference between the height of the mold and the height over the displaced original center of the top surface of the specimen. If a decided falling away or

shearing off of concrete from one side or portion of the mass occurs disregard the test and make a new test on another portion of the sample.

If two consecutive tests on a sample of concrete show a falling away or shearing of a portion of the concrete from the mass of the specimen, the concrete probably lacks necessary plasticity and cohesiveness for the slump test to be applicable.

e. REPORTING

Record the slump in terms of mm (in) to the nearest 5 mm (1/4 in) of subsidence of the specimen during the test as follows:

$$S = A - B$$

Where: S = Slump of the concrete.
A = Height of mold.
B = Height of concrete after removal of mold.